Claims:

1. A fuel cell system for producing electrical power, comprising:

a fuel cell having a first reactant inlet, a first reactant outlet, a second reactant inlet, and a second reactant outlet;

a first reactant supply subsystem for supplying a first reactant incoming stream to the first reactant inlet of the fuel cell at a first reactant supply rate;

a second reactant supply subsystem for supplying a second reactant incoming stream to the second reactant inlet of the fuel cell at a second reactant supply rate; and,

a conditioning component for conditioning at least one of the first reactant incoming stream and the second reactant incoming stream to a selected conditioning level, wherein the selected conditioning level is reducible to increase at least one of the first reactant supply rate and the second reactant supply rate.

2. The fuel cell system as defined in claim 1 further comprising

a monitoring device for monitoring at least one system variable; and,

a controller for increasing at least one of the first reactant supply rate and the second reactant supply rate by reducing the selected conditioning level in response to changes in the at least one system variable.

3. The fuel cell system as defined in claim 2 wherein the selected conditioning level is a selected humidification level and the reactant conditioning component is a reactant humidification component for humidifying at least one of the first reactant incoming stream and the second reactant incoming stream to the selected humidification level.

4. The fuel cell system as defined in claim 3 further comprising a first reactant recirculation subsystem for recirculating at least a portion of a first reactant exhaust stream from a first reactant outlet of the fuel cell to the reactant humidification component, wherein

the reactant humidification component is operable to transfer heat and moisture from the first reactant exhaust stream to at least one of the first reactant incoming stream and the second reactant incoming stream; and

the controller is operable to control the first reactant recirculation subsystem to temporarily reduce the portion of the first reactant exhaust stream recirculated to increase at least one of the first reactant supply rate and the second reactant supply rate.

5. A fuel cell system as claimed in claim 4, further comprising a first reactant purge means for purging the first reactant stream from the first reactant outlet, wherein, in response to changes in the at least one system variable, the controller is operable to control the first reactant purge means to purge at least a portion of the first reactant exhaust stream from the first reactant outlet.

6. A fuel cell system as claimed in claim 5, wherein

the at least one system variable comprises at least one of the first value representing the demand for power output and a second value representing the rate at which the demand for power output changes;

when the first value changes beyond a first predetermined level, the controller controls the first reactant purge means to purge and regulate the amount of the first reactant exhaust stream purged based on changes in the first value; and,

when the second value changes beyond a second predetermined level, the controller controls the first reactant purge means to

purge and regulate the amount of the first reactant exhaust stream purged based on changes in the second value.

7. A fuel cell system as claimed in claim 4, further comprising a first reactant purge means, wherein the controller is operable to control the first reactant purge means to switch between a first position for recirculating the first reactant exhaust stream and a second position for purging the first reactant exhaust stream.

8. A fuel cell system as claimed in claim 7, wherein the at least one system variable comprises at least one of the first value representing the demand for power output and a second value representing the rate at which the demand for power output changes; when the first value changes beyond a first predetermined level, the controller controls the purge means to switch from the first position to the second position; and, when the second value changes beyond a second predetermined level, the controller controls the first reactant purge means to switch from the first position to the second position.

9. A fuel cell system as claimed in claim 3, wherein the reactant humidification component comprises a first regenerative dryer device for transferring at least a portion of the heat and moisture from the first reactant exhaust stream to the first reactant incoming stream in the first reactant supply subsystem, and a second regenerative dryer device for transferring at least a portion of the heat and moisture from the first reactant exhaust stream to the second reactant incoming stream in the second reactant supply subsystem.

10. The fuel cell system as defined in claim 1 further comprising a user input device for selectably reducing the selected conditioning level.

11. The fuel cell system as defined in claim 10 wherein the selected conditioning level is a selected humidification level and the reactant conditioning component is a reactant humidification component for

humidifying at least one of the first reactant incoming stream and the second reactant incoming stream to the selected humidification level.

12. The fuel cell system as defined in claim 11 further comprising a first reactant recirculation subsystem for recirculating at least a portion of a first reactant exhaust stream from a first reactant outlet of the fuel cell to the reactant humidification component, wherein

the reactant humidification component is operable to transfer heat and moisture from the first reactant exhaust stream to at least one of the first reactant incoming stream and the second reactant incoming stream; and

the user input device is operable by a user to control the first reactant recirculation subsystem to temporarily reduce the portion of the first reactant exhaust stream recirculated to increase at least one of the first reactant supply rate and the second reactant supply rate.

13. A fuel cell system as claimed in claim 12, further comprising a first reactant purge means for purging the first reactant stream from the first reactant outlet, wherein, in response to instructions from the user input device, the first reactant purge means is operable to purge at least a portion of the first reactant exhaust stream from the first reactant outlet.

14. A fuel cell system as claimed in claim 11, wherein the reactant humidification component comprises a first regenerative dryer device for transferring at least a portion of the heat and moisture from the first reactant exhaust stream to the first reactant incoming stream in the first reactant supply subsystem, and a second regenerative dryer device for transferring at least a portion of the heat and moisture from the first reactant exhaust stream to the second reactant incoming stream in the second reactant supply subsystem.

15. A method of operating a fuel cell system for producing electrical power, the fuel cell having a first reactant inlet, a first reactant outlet, a second reactant inlet, and a second reactant outlet, said method comprising:

(a) providing a first reactant incoming stream to the first reactant inlet at a first reactant supply rate;

(b) providing a second reactant incoming stream to the second reactant inlet at a second reactant supply rate;

(c) conditioning at least one of the first reactant incoming stream and the second reactant incoming stream to a selected conditioning level;

(d) selectably and temporarily reducing the selected conditioning level to increase at least one of the first reactant supply rate and the second reactant supply rate.

16. The method as defined in claim 15 further comprising monitoring at least one system variable, wherein step (d) comprises increasing at least one of the first reactant supply rate and the second reactant supply rate by reducing the selected conditioning level in response to changes in the at least one system variable.

17. The method as defined in claim 16 wherein the selected conditioning level is a selected humidification level and step (c) comprises conditioning at least one of the first reactant incoming stream and the second reactant incoming stream to the selected humidification level.

18. The method as defined in claim 17 wherein step (c) comprises recirculating at least a portion of a first reactant exhaust stream from a first reactant outlet of the fuel cell to transfer heat and moisture from the first reactant exhaust stream to at least one of the first reactant incoming stream and the second reactant incoming stream; and step (d) comprises selectably and temporarily reducing the portion of the first reactant exhaust stream

recirculated to increase at least one of the first reactant supply rate and the second reactant supply rate.

19. A method of operating a fuel cell system as claimed in claim 17, wherein step (d) comprises purging at least a portion of the first reactant exhaust stream from the first reactant outlet.

20. A method of operating a fuel cell system as claimed in claim 18, wherein step (d) further comprises reading at least one of the first value representing the demand for power output and a second value representing the rate at which the demand for power output changes and wherein when one of the first value changes beyond a first predetermined value and the second value changes beyond a second predetermined value, purging the first reactant exhaust stream and regulating the amount of the first reactant exhaust stream purged in response to the change in at least one of the first value and the second value.

21. A method of operating a fuel cell system as claimed in claim 20, wherein step (d) comprises purging all the first reactant exhaust stream from the reactant outlet.

22. A method of operating a fuel cell system as claimed in claim 21, wherein step (d) further comprises reading at least one of the first value representing the demand for power output and a second value representing the rate at which the demand for power output changes and wherein when one of the first value changes beyond a first predetermined value and the second value changes beyond a second predetermined level, purging all the first reactant exhaust stream from the reactant outlet.